

NON-PUBLIC?: N
ACCESSION #: 9103200191
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Trojan Nuclear Plant PAGE: 1 OF 06

DOCKET NUMBER: 05000344

TITLE: Inadequate Drawings Result in Development of Inadequate Work
Instructions and Lead to Inappropriate Jumper Placement and
Reactor Trip

EVENT DATE: 02/12/91 LER #: 91-004-00 REPORT DATE: 03/14/91

OTHER FACILITIES INVOLVED: NA DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: E. W. Ford, Compliance Engineer TELEPHONE: (503) 556-5577

COMPONENT FAILURE DESCRIPTION:

CAUSE: SYSTEM: COMPONENT: MANUFACTURER:

REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On February 12, 1991, the Trojan Nuclear Plant was operating at 100 percent Rated Thermal Power. At 1020, maintenance was in progress to repair a damaged electrical conduit associated with the plant lighting system. During the course of the repairs, a wiring jumper was incorrectly installed within a lighting contactor panel, and resulted in 120 Volt A.C. power being applied to the negative leg of a 125 Volt D.C. bus. The electrical noise on the D.C. bus resulted in actuation of the Electro-Hydraulic Control Master Trip Bus, tripping the turbine. The turbine trip initiated a Reactor trip. Following the Reactor trip, Auxiliary Feedwater was initiated on a low-low steam generator level signal and Main Feedwater was isolated on a Reactor trip combined with low Tave signal. The cause of this event was the lack of adequate drawings which resulted in the preparation of inadequate work instructions. This in turn led to installation of the jumper in an

inappropriate location. An Engineering Evaluation and component walkdown were performed and determined that no damage to plant components occurred. Procedures have been revised to require specific instructions for the placement of electrical jumpers.

END OF ABSTRACT

TEXT PAGE 2 OF 6

EVENT DESCRIPTION

On February 12, 1991, the Trojan Nuclear Plant was in Mode 1 (Power Operation) at 100 percent Rated Thermal Power. The generator load was approximately 1139 MW. At 1020, maintenance was in progress to repair a damaged electrical conduit associated with the plant lighting system. During the course of the repairs, a wiring jumper was incorrectly installed within a lighting contactor panel, and resulted in 120 Volt A.C. power being applied to the negative leg of a 125 Volt D.C. bus (Both A.C. and D.C. circuits are contained in the panel). The electrical noise created by the A.C. signal on the D.C. bus simultaneously actuated three relays in the turbine Electro-Hydraulic Control (EHC) 125 Volt trip system. The relays energized the EHC Master Trip Bus, which tripped the turbine. The turbine trip initiated a Reactor trip. Following the Reactor trip, Auxiliary Feedwater was initiated on a low-low steam generator level signal and Main Feedwater was isolated on a Reactor trip combined with low Tave signal.

During the transient associated with the plant trip, the following plant equipment failed to perform as expected.

The "A" Steam Generator power operated relief valve partially opened at a lower than expected Steam Generator pressure. This was determined to be related to the controller setpoint and suspected to be the result of instrument drift. The controller was recalibrated and the calibration of the other Steam Generator power operated relief valve controllers was checked and found to be satisfactory. Preventive Maintenance frequency for recalibration of the Steam Generator power operated relief valve controllers has been increased from semiannually to quarterly.

The steam dump valve controller did not function when it was in the automatic pressure control mode. The automatic/manual control switch was found to be malfunctioning and was replaced.

The Main Feedwater Pump suction thermal relief valves lifted and failed to reseal. The valves have a tendency to stick open after

lifting. The setpoints for these valves have been evaluated to be too low for this application. Therefore, the valves have been disabled and will be repaired or replaced during the 1991 Refueling Outage. Sufficient relief capacity still exists to preclude an overpressurization of this piping.

TEXT PAGE 3 OF 6

These equipment events did not significantly affect the course of the plant transient.

The reactor trip was the result of an automatic actuation of the Reactor Protection System, and the Auxiliary Feedwater initiation was the result of an automatic Engineered Safety Features Actuation System signal. Both of these events are reportable under the requirements of 10 CFR 50.73 (a) (2) (iv). This report is submitted to fulfill those requirements. This event was also reported via the Emergency Notification System in accordance with the requirements of 10 CFR 50.72.

CAUSE

A root cause analysis was performed to determine what factors contributed to the occurrence of this event. The analysis concluded that the lack of adequate drawings resulted in the preparation of inadequate work instructions and led to installation of the jumper in an inappropriate location.

The work instructions, as originally written, called for de-energization of the circuit associated with the damaged conduit, and performing the repairs while the circuit was de-energized. The circuit to be worked on contains a relay which actuates emergency D.C. lighting upon a loss of A.C. power. Operations personnel, who reviewed the work instructions prior to allowing work to begin, were concerned with the instructions because the lights would be continuously energized by the plant batteries or battery chargers while the work was in progress. Based upon these concerns, an attempt was made to revise the work plans to provide an alternate supply of power to the relay (prevent actuation of the emergency D.C. lighting) while the circuit was de-energized.

On February 8, 1991, work to replace the damaged conduit was started but had to be stopped because the work instructions failed to keep the emergency D.C. lighting from being energized when A.C. power was removed from the circuit being repaired. The work instructions were revised again on February 11, 1991 by the Electrical Unit Supervisor. The work which resulted in the plant trip began on February 12, 1991. Due to the

lack of panel layout drawings and the lack of labeling within the panel, the instructions were broadly written and did not provide specific termination points for the jumpers. In trying to accomplish the instructions, the electrician mistakenly connected a jumper between an A.C. power source and a D.C. contactor.

TEXT PAGE 4 OF 6

Several additional factors were determined to have contributed to the occurrence of this event. These factors are discussed below.

The extent of the risk associated with performing the conduit repair was not identified by plant personnel.

The work instructions included requirements for peer verification of the jumper placement. Administrative procedures governing the performance of peer verification allow the verification to be done either concurrently with the work step, or independently, after the work step has been performed. In this case, the verification was chosen to be performed following installation of the jumper.

The work instructions were prepared without performing a complete walkdown of the components being worked on even though the drawings were not adequate. A walkdown was not considered necessary because of the low assessed risk associated with performance of the job.

CORRECTIVE ACTIONS

An Engineering Evaluation and component walkdown were performed to determine whether the application of A.C. power to the D.C. bus damaged plant components. The evaluation determined that no damage should have occurred, and none was found.

Administrative Order 3-9, Maintenance Request Planning, was revised to require that the work planner designate specific termination points for jumpers used in performance of the work. If the work planner is unable to indicate the termination points, the procedure requires the information to be obtained in the field by the craftsman assigned the work. The work package must then be approved by the work group supervisor before the jumpers are installed. This procedure revision became effective on February 21, 1991.

The Maintenance Department has been assigned action to revise the existing procedural guidance on the peer verification process and develop improvements for work on energized circuits. This will be completed by May 31, 1991. The Maintenance and Planning Departments have also been

assigned action to improve methods for determining the risk associated with performing a job and providing guidance on when to seek engineering assistance in planning or performing work. This will be completed by May 31, 1991. In addition to these actions, maintenance Department personnel will be given formal training in the practice of self checking. This

TEXT PAGE 5 OF 6

training will be completed by September 30, 1991. Self checking practices will also be discussed with Maintenance Department personnel during shop meetings prior to March 27, 1991.

This event was discussed with the electrician and Electrical Unit Supervisor involved. The Electrical Unit Supervisor was given guidance on the need to ensure that revisions to work instructions are clear and sufficiently detailed to be understood and performed by any electrician. The need to review all technical details associated with work instructions was also discussed.

The electrician was given guidance on the following items.

Stopping work and reviewing the instructions with supervisors and peers when there is uncertainty regarding the intent or execution of work activities.

The authority and responsibility to request clarification of unclear work instructions prior to starting work.

Exercising a mental review of critical actions prior to their performance to ensure that the actions are correct.

These lessons will also be discussed with appropriate personnel within the Maintenance Department.

SAFETY SIGNIFICANCE

This event did not adversely affect the health and safety of the public. The !Reactor Trip System responded, as designed, to trip the reactor when the turbine was tripped. Auxiliary Feedwater initiation on low-low Steam Generator level is an expected occurrence following a reactor trip from full power due to a decrease in level associated with the Steam Generator pressure transient. The only anomalies associated with the trip were described in the Event Description Section of this report, and had no significant impact upon the course of the transient.

TEXT PAGE 6 OF 6

PREVIOUS SIMILAR EVENTS

Three Licensee Event Reports describing previous similar events were identified. Each of these reports is briefly described below.

LER No. Description

87-21 This report described an event in which an Emergency Diesel Generator was inadvertently started during fuse replacement because the wrong fuse drawer was opened. The event was attributed to personnel error, with the lack of a written procedure and inadequate component labeling among the contributing causes.

88-26 This report described an event in which a Reactor trip occurred during calibration of a flow transmitter. The event was attributed to inadequate work instructions for performing the task. A contributing cause was personnel error.

88-28 This report described an event in which a Reactor trip occurred during replacement of a pressure transmitter. The event was attributed to inadequate work instructions and personnel error was listed as a contributing cause.

ATTACHMENT 1 TO 9103200191 PAGE 1 OF 1

PGE

Portland General Electric Company
Trojan Nuclear Plant March 14, 1991
71760 Columbia River Hwy WRR-064-91
Rainier, Oregon 97048
(503) 556-3713

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington DC 20555

Gentlemen:

Licensee Event Report No. 91-04 is attached. This report discusses an event in which improperly locating a jumper within a lighting contactor panel resulted in a plant trip.

Sincerely,

W. R. Robinson
General Manager
Trojan Nuclear Plant

c: Mr. John B. Martin
Regional Administrator, Region V
U.S. Nuclear Regulatory Commission

Mr. David Stewart-Smith
State of Oregon
Department of Energy

Mr. R. C. Barr
USNRC Resident Inspector
Trojan Nuclear Plant

LER Distribution

*** END OF DOCUMENT ***
